

THE GENUS COLUMNEA (GESNERIACEAE) IN PANAMA

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I have been working from time to time on Columnea in Panama and Costa Rica for many years. My treatment of the Costa Rican species was published in Standley's "Flora of Costa Rica" in 1938, but I have not published a key to the Panamanian species, which are even more numerous than the Costa Rican perhaps, although there are several Costa Rican species as yet undescribed. It seems that almost every new collection from virgin forests in Central America and Colombia yields undescribed species. When forests are cleared it appears that Columneas are completely exterminated and do not come back in secondary growth, which explains why several of the species have been found only once, and may never be found again.

The division of Columnea into sections by Hanstein, Benthham and Hooker, and by Fritsch is not wholly satisfactory. The matter needs to be considered in depth. Very recently, William T. Stearn published a beautifully prepared and documented paper "The Jamaica Species of Columnea and Alloplectus (Gesneriaceae)" (Bull. Brit. Mus. Nat. Hist. 4 (5): 181-236, t. 14-21. 1969) in which he proposed a new alignment of the species. Columnea is restricted to the section Columnea itself, in which pollination is by humming birds, so far as known, and which is distinguished morphologically by having the four anterior corolla lobes united into a galea and the posterior lobe narrower and spreading or deflexed. The stamens are exserted and the anthers are initially connate. The section Cryptocolumnea would obviously belong here also, although Stearn does not mention it, for it has exactly the same kind of corolla and stamens, and differs only in having the leaves of a pair strongly unequal. Stearn refers all the other species to Alloplectus tentatively, but it does not discuss them in detail.

This is a radical viewpoint, and it does not solve the problems by any means, for it leaves Alloplectus very heterogeneous indeed, including plants with the corollas erect in the calyx or horizontal, bilabiate or regular, contracted in the throat or not; the fruits fleshy berries or capsule-like; the disk composed of five glands or reduced to one. Most importantly, there is no overall resemblance between these "Alloplectus" species, such as ought to characterize a genus regardless of individual characters. Moreover, the method of pollination of most species of Alloplectus remains to be determined and some may indeed be pollinated by humming birds. For these reasons I am not following Stearn in his definitions. It may be remarked that the anthers offer some useful characters, particularly as regards the distinction between Alloplectus and Drymonia.

The chromosome number is $n = 9$ in those Panamanian species so far investigated, namely C. consanguinea, C. hirta, C. nicaraguensis, C. warscewicziana, C. sanguinolenta, C. illepida, and C. moorei

(cf. Cytogenetic Studies in the Genus *Columnnea* L.. by Lawrence Carl Sherk) (MS Thesis, Cornell University, 1960). It should be mentioned also that although I have described the stigmas of the various species as either stomatomorphic or bilobed the distinction is by no means always clear from dried material. This character needs to be studied by itself and in more detail, especially from fresh specimens.

The type of *Alloplectus* Mart. is conserved as *A. sparsiflorus* Mart. That this may not be the best choice will be discussed in a future paper by Mr. Hans Wiehler, who has made some valuable contributions to our knowledge of the relationships of the genera of the Tribe Columnneae (Cornell University Thesis, 1970, unpublished.)

Key to the Species of *Columnnea* in Panama

- Corollas regular or if slightly bilabiate the two upper lobes erect, only partially connate, the other 3 free, spreading, the tube contracted in the throat.
- Leaves of a pair equal or subequal. Corolla ventricose, contracted in throat.....sect. I. *Stygnanthe*
- Leaves of a pair strongly unequal, the smaller less than half as long as the larger, sometimes minute and stipule-like.
- Corollas yellow or orange, nearly regular, the lobes subequal; flowers usually fasciculate, crowded, subsessile or very short-pedicellate, erect, bracteate; terrestrial or epiphytic shrubs.....sect. II. *Collandra*
- Corollas red, the limb slightly irregular, sometimes with linear appendages between the lobes; flowers solitary or paired, mostly long-pedunculate; epiphytic, often pendent shrubs.
- Calyx lobes pectinate-fimbriate; leaf-blades glabrous above.
- sect. III. *Stenanthus*
- Calyx lobes entire, serrate, or with a few subulate teeth; leaf-blades hirsute above.....sect. IV. *Ortholoma*
- Corollas strongly bilabiate, the four upper lobes united into a galea, this trilobed, the lateral lobes short and spreading, the central lobe (composed of the connate uppermost lobes) entire or merely emarginate, the lower lobe free, spreading or deflexed, the tube not contracted in throat.
- Leaves of a pair equal or subequal.
- Corolla-tube mostly cylindric, not strongly curved, the lower lobe deflexed; leaf-blades not more than 5 cm. long, usually less (except in *C. nicaraguensis*).....sect. V. *Columnnea*
- Corolla-tube curved, ventricose, the lower lobe spreading; leaf-blades 5-12 cm. long.....sect. VI. *Pentadenia*
- Leaves of a pair strongly unequal, the smaller less than half the size of the larger.....sect. VII. *Cryptocolumnnea*

Sect. I. *Stygnanthe*

- Disk-glands 5; corolla yellow; peduncles 2-2.5 cm. long, erect.
- Leaf-blades ovate to rhombic, 3.2-6.7 cm. wide; calyx lobes strongly serrate.....1. *C. rubida*

Disk reduced to a solitary posterior gland; corollas red or red with the three lower lobes yellow; peduncles 3-5 cm. long, pendent.

Calyx-lobes pectinately incised, with 4-6 pairs of linear lateral lobes; leaf-blades broadly elliptic, 10-12 mm. wide; corollas with the galea red and the 3 lower lobes yellow. Corolla with minute appendages between the lobes. 2. C. moorei

Calyx-lobes subentire; leaf-blades lanceolate, 26-32 mm. wide; corollas entirely red. 3. C. pendula

Sect. II. COLLANDRA

Corolla 40-50 mm. long, about twice as long as the calyx. Leaf-blades hirsute on both sides.

Longest leaf of a pair up to 5 cm. long, glandular-pilose; corollas orange, the tube pilose, the lobes yellow, unspotted.

4. C. translucens

Longest leaf of a pair up to 16 cm. long, hirsute but not glandular; corolla yellow, the lobes red-spotted at base.

Corolla-tube pilose; leaves green on both sides, not red-spotted beneath. 5. C. silvarum

Corolla-tube entirely glabrous; leaves red beneath at apex or sometimes all over. 6. C. perpulchra

Corollas only slightly or not at all exerted from the calyx.

Leaf blades pilose or hirsute on the upper surface. Calyx-lobes fimbriate-pectinate; leaves toothed.

Leaves with red tips beneath; calyx-lobes about 15 mm. long; corollas about 17 mm. long. 7. C. pectinata

Leaves not red-spotted beneath; calyx-lobes and corollas about 30 mm. long. 8. C. purpurata

Leaf blades glabrous on the upper surface, or only sparingly and deciduously strigillose, entire.

Leaves not red beneath. Calyx-lobes serrate. 9. C. darienensis
Leaves red-spotted beneath below apex.

Calyx-lobes deeply pectinate-fimbriate. 10. C. florida
Calyx-lobes entire or serrate.

Stems hirsute; calyx-lobes hirsute; leaf-blades thick.

11. C. crassa

Stems strigose; calyx-lobes substrigose; leaf-blades chartaceous.

Corollas densely sericeous. 12. C. consanguinea

Corollas sparsely glandular-pilose. 13. C. conferta

Sect. III. STENANTHUS

Leaves glandular-denticulate, often red-spotted beneath; stems strigose. 14. C. sanguinolenta

Leaves acutely serrate, not red-spotted; stems villous.

15. C. serrata

Sect. IV. ORTHOLOMA

Corollas with linear appendages between the lobes.

- Corolla-tube sparingly pilose, with most of the surface visible, the tube upwardly with dark lines descending from the sinuses, and the lobes dark margined; calyx-lobes ca. 17 mm. long, green; leaves rose beneath..... 16. C. illepidia
- Corolla-tube densely tomentose, the surface not visible; calyx-lobes 25-30 mm. long; leaves green beneath.... 17. C. dissimilis
- Corollas lacking appendages between the lobes.
- Leaf-blades oblanceolate, green beneath; peduncles 15-45 mm. long; corollas 40-55 mm. long..... 18. C. warscewicziana
- Leaf-blades lanceolate, purple beneath; peduncles very short; corollas 37-40 mm. long..... 19. C. ochroleuca

Sect. V. COLUMNEA

- Corollas densely sericeous externally, the tube not much exceeding the calyx; leaf-blades 7-12 cm. long, minutely strigillose on the upper surface; filaments puberulous.... 20. C. nicaraguensis
- Corollas sparsely pilose externally, the tube mostly much exceeding the calyx; leaf-blades 2-5 cm. long; filaments glabrous (except in C. panamensis and C. mertonii).
- Leaf-blades hairy on the upper surface.
- Calyx-lobes ovate-lanceolate, broadest near the base, deeply toothed.
- Corollas 40-45 mm. long; leaf-blades densely tomentose.
21. C. tomentulosa
- Corollas 50-60 mm. long; leaf-blades sparingly strigose.
22. C. flaccida
- Calyx-lobes narrowed toward base, entire or with 1 or 2 short teeth on each side; corollas (50)65-85 mm. long.
- Stems strigose; calyx-lobes entire. Filaments pilosulous; leaf-blades densely strigose-pilose on both sides.
23. C. panamensis
- Stems spreading pilose or villous; calyx lobes toothed (except in C. localis).
- Calyx-lobes linear-lanceolate or narrowly elongate-triangular.
- Calyx-lobes with 2 pairs of prominent teeth, ca. 15 mm. long; filaments nearly glabrous; corollas ca. 70 mm. long; peduncle-bracts linear; leaf-blades oblong, more than twice as long as broad..... 24. C. hirta
- Calyx-lobes with 1 pair of inconspicuous teeth, 10-12 mm. long; filaments strongly glandular-pilose; corollas 80-85 mm. long; peduncle-bracts deltoid, leaf-blades ovate, less than twice as long as broad. 25. C. mertonii
- Calyx-lobes broadly obovate..... 26. C. localis
- Leaf-blades glabrous on the upper surface.
- Stems stiffly hispid.
- Calyx green, 20-23 mm. long, the lobes with 3 or 4 teeth on each side; corollas 70 mm. long; leaf-blades thin, the veins prominent beneath..... 27. C. consimilis

- Calyx red, 15 mm. long, the lobes with 5 or 6 teeth on each side; corollas 45-60 mm. long; leaf-blades thick, the veins obscure on both sides.....28. C. arguta
- Stems strigose.
- Ovary glabrous, except at apex; corollas 40-45 mm. long, slender, 5-7 mm. wide in throat.
- Calyx-lobes red, toothed in the lower part, prominently pilose on midribs and margins; leaf-blades sharp-pointed, red beneath.....29. C. billbergiana
- Calyx-lobes green, inconspicuously glandular-denticulate, only sparsely pilosulous; leaf-blades merely acutish, green..... 30. C. percrassa
- Ovary densely sericeous or tomentose throughout; corollas (50)60-80 mm. long, 7-15 mm. side in throat.
- Calyx-lobes toothed, the teeth short, broad-based.
- Leaf-blades ovate, obtuse or acutish, 10-16 mm. long.
31. C. oerstediana
- Leaf-blades lanceolate or ovate-lanceolate, acuminate, 20-33 mm. long.....32. C. tenuis
- Calyx-lobes entire.
- Calyx-lobes 12-18 mm. long, about 6 mm. wide; lower lobe of the corolla 14-17 mm. long.33. C. obliqua
- Calyx-lobes 22-30 mm. long, about 10 mm. wide; lower lobe of the corolla 27-30 mm. long...34. C. allenii

Sect. VI. PENTADENIA

- Leaf-blades densely tomentose above, deep violet beneath; corollas 4 cm. long; disk-glands 5..... 35. C. nervosa
- Leaf-blades glabrous or sparingly appressed-pilose above, green or reddish beneath; corollas 6-7 cm. long; disk-gland 1.
- Calyx-lobes hirsute, ovate-lanceolate, about 5 mm. wide at base.
36. C. magnifica
- Calyx-lobes ciliate, otherwise glabrous, ovate, about 15 mm. wide near base..... 37. C. incarnata

Sect. VII. CRYPTOCOLUMNEA

- Leaf-blades more or less hairy on the upper surface.
- Corollas yellow, conspicuously purple-spotted within limb. Calyx-lobes ovate-lanceolate, deeply lacinate-toothed; filaments pilosulous upwardly..... 38. C. maculata
- Corollas red, unspotted, the throat sometimes yellow within.
- Corolla-tube densely white-sericeous; calyx-lobes lanceolate or ovate-lanceolate, 7-9 mm. wide, white-sericeous, especially on the midrib; leaf-blades minutely strigillose above.
20. C. nicaraguensis
- Corolla-tube sparsely pilose; calyx-lobes linear, about 2.5 mm. wide, red-hirsute; leaf-blades densely hirsute above.
39. C. hirsutissima
- Leaf-blades glabrous on the upper surface. Corollas yellow, or yellow lined with rose; filaments glabrous.

Calyx-lobes greenish-yellow, ovate-lanceolate, 30-45 mm. long and 12-14 mm. wide; leaf-blades 20-27 cm. long.

40. C. citrina

Calyx-lobes red, linear-lanceolate, 19 mm. long, 5 mm. wide glandular-serrate; leaf-blades up to 14 cm. long.

41. C. rubra

1. Columnea rubida (Morton) Morton, Baileya 7: 58. 1959.

Alloplectus rubidus Morton, Ann. Mo. Bot. Gard. 24: 204. 1937.

Plants sublignose, the stems ascending, unbranched, about 6 mm. in diameter, pilose near apex; leaves clustered near apex, those of a pair subequal, petiolate; petioles up to 1.7 cm. long, densely pilose; leaf-blades ovate or subrhombic, up to 16 cm. long, 3.2-6.7 cm. wide, membranous, acute or acuminate, decurrent into the petiole, reddish on both sides, obviously serrate-denticulate, pilose above, the hairs reddish, flaccid, multicellular, pilose beneath on the veins, substrigose on the surface, the hairs rigid, 2-celled, the basal cell short, reddish, the terminal cell white, large, acuminate, the lateral veins 8 or 9 pairs; flowers solitary; peduncles 2-2.5 cm. long, pilose, ebracteate; calyx red, about 15 mm. long, the lobes equal, erect, lanceolate, about 5 mm. wide at base, subulate-acuminate, long-pilose externally, pilosulous within, obviously serrate, the teeth about 5 on each side, subulate; corollas yellow, erect, 33-38 mm. long, not spurred at base, about 5.5 mm. in diameter above base, ventricose at the middle and about 10 mm. wide, contracted in throat, here about 7 mm. wide, strigose externally, pilosulous within at base, glabrous upwardly, the limb a little oblique, slightly irregular, the two upper lobes connate throughout into a galea 2.5 mm. long and 8 mm. wide, this truncate, lightly undulate, the lateral lobes rounded, free, semiorbicular, about 2.5 mm. long and 4 mm. wide at base, erect, the lower lobe erect, semiorbicular, mucronate at apex; filaments sparsely pilosulous; anthers free, 2 mm. long, 1.5 mm. wide; ovary long-pilose; style glabrous; disk glands 5.

TYPE: Valley of Upper Río Chiriquí Viejo, in the vicinity of Monte Lirio, Seibert 141.

RANGE: Known only from Panama, at elevations from 1300-1900 meters.

CHIRIQUI: Southwestern slopes of Volcán Baru, in cloud forest at 1,500 m., Summer, 1968, Butcher.

This is one of the species that does not fit comfortably into either Alloplectus or Columnea. I do not believe that any Alloplectus species have five disk glands, but there are some Columneas that do, and consequently the closer alliance may be with Columnea, which is shown also by the erect, unspurred corollas. A species from Chiapas, still undescribed, appears allied.

2. Columnea moorei Morton, Baileya 7: 55, f. 15. 1959.

Trichantha moorei (Morton) Morton, Contr. U. S. Nat. Herb. 38: 10. 1963.

Stems succulent, scandent, at least 30 cm. long and probably much more, unbranched (except probably at base), probably not radicant at the nodes, the internodes very short, about 1 cm. long, fleshy,

minutely strigillose with sharp-pointed, 2-celled, appressed hairs and also with a few multicellular hairs toward the apex, glabrescent, bearing 2 pairs of conspicuous glands (these often coalescent in pairs) at each node between the leaves and just below a "stipular" line; leaves thick-fleshy, dark green and shining above, light green beneath, obviously decussate, those of a pair equal, short-petiolate; petioles 3 mm. long, 1 mm. thick, glabrate; leaf-blades broadly elliptic, very uniform in size, 14-16 mm. long, 10-12 mm. wide, obtuse at base and apex, almost entire but with one or two low, broad, inconspicuous crenations on each side, almost glabrous, bearing a few, minute, appressed hairs beneath especially on the midrib, the margins obviously ciliolate with several-celled hairs; flowers solitary in an axil, bibracteate, the bracts minute, linear, 1-2 mm. long, deciduous, pilosulous; peduncles arching, curved at apex, 30-45 mm. long, slender, 1 mm. thick at base, becoming enlarged and 2-3 mm. thick at apex, red, conspicuously long-setose-pilose, the hairs red, 2-3 mm. long, many-celled, spreading at right angles; calyx green, 5-parted, the lobes erect, equal, 12-15 mm. long, 8-11 mm. wide including the teeth, conspicuously and deeply pectinately parted, the central portion of the lobe lanceolate, about 3 mm. wide, the teeth 4-6 pairs, linear, spreading horizontally, the basal ones about 3-4 mm. long, the uppermost about 2 mm. long, all 0.8-1 mm. wide just above the base, conspicuously red-gland-tipped, the body and teeth externally conspicuously long-red-hirsute, the hairs 2-4 mm. long, many-celled, sharp-pointed, and also with a few, appressed, white, sharp-pointed, 2-celled hairs, within nearly glabrous but with a few stiff red hairs and also slightly glandular; corolla suberect in calyx, red (except the lobes), 50-55 mm. long, gibbous at the posterior base, the gibbosity 3 mm. wide, the tube 3-4 mm. wide just above base, gradually enlarged upwardly but only slightly ventricose, 10-11 mm. wide near apex, sparsely but conspicuously hirsute externally, the hairs 4-6 mm. long, red, many-celled, sharp-pointed, horizontally spreading, and also with minute, spreading hairs, glabrous within except toward throat, where conspicuously glandular-pilosulous, the throat only slightly contracted, the limb slightly bilabiate, the two upper lobes erect, red with narrow yellow margins, rounded, 4 mm. long, connate for about 2 mm., sparsely ciliolate, glabrous within at apex but strongly capitate-glandular lower down, the three lateral lobes clear yellow, not red-margined, slightly plicate at the angles between the lobes, erect, subequal, subdeltoid, about 5-6 mm. wide at the base and 5 mm. long, sparsely hirsute externally, more or less ciliate, glabrous within and not capitate-glandular, the appendages in the sinuses between the lobes yellow, small and hardly discernible in dried specimens; stamens attached to the corolla at the very base, the filaments pale yellowish white, connate at base for 4-5 mm., free upwardly, somewhat curved but not contorted, glabrous, the anthers slightly exserted from the corolla tube, all four permanently connate, subquadrate, about 1 mm. long and wide, the cells oblong, fully dehiscent

longitudinally, glabrous; staminodium none; ovary oblong in outline, 4-4.5 mm. long, densely white-sericeous; style white, straight, 5-5.5 cm. long, exserted, pilosulous; stigma bilobed; disk reduced, to a solitary posterior gland, this white, thick, fleshy, not bilobed, ca. 1-1.5 mm. wide, 1.5-2 mm. long.

TYPE: Panama, cultivated at Bailey Hortorium, Moore in 1958 (US).

RANGE: Known only from the original material, of unknown origin.

3. *Columnnea pendula* (Klotzsch) Hanst. *Linnaea* 34: 397. 1865.

Ortholoma pendulum Klotzsch. ex Oerst. *Centralamer. Gesner.* 52. 1858.

Stems pilose at apex; leaves of a pair subequal, subsessile, leaf-blades obliquely lanceolate, 7.5-10 cm. long, 2.6-3.2 cm. wide, acuminate, rounded at base, subentire, strigose-hirtous above, pubescent beneath, sometimes reddish beneath; flowers solitary (?); peduncles 5 cm. long or more, pendulous, puberulous; calyx about 16 mm. long, the lobes linear-lanceolate, long-acuminate, subentire, pubescent; corolla red, about 50 mm. long, the tube about 6 mm. in diameter at base, ventricose, becoming 14-16 mm. in diameter, contracted in throat and there 10-12 mm. wide, nearly glabrous, the limb only a little irregular, 18 mm. wide, the two upper lobes yellow, partly connate, erect, rounded, the three other lobes subequal, spreading, rounded; ovary pilose; disk reduced to a single posterior gland.

TYPE: Veraguas, Panama, Warszewicz. The holotype in Berlin was destroyed.

RANGE: Known only from the type. This species can be fully known only if new material is discovered.

4. *Columnnea translucens* Raymond, *Bot. Notis.* 114: 351, f. 4,5. 1961.

Epiphytic subshrub, the branches subrigid, horizontal, short, stout, 3-4 mm. thick, densely covered with glandular hairs and orange-red, multicellular hairs; leaves of a pair unequal, petiolate; petioles 4-5 mm. long, densely hirsute and glandular; larger leaf-blades elliptic-oblong, up to 5 cm. long, 2-3 cm. wide, acuminate, strongly oblique at base, the margins incurved, the smaller similar but only 1.2-2 cm. long and 1 cm. wide; flowers 1-3 in an axil, pedunculate; peduncles 2-4 cm. long, hirsute and glandular; calyx green, the lobes free, subequal, irregular, remotely toothed, the margins incurved, outside hirsute and glandular; corollas orange, translucent, oblique in calyx, much exceeding calyx, 40-50 mm. long, tubular, the base slightly gibbous, the tube becoming 9-11 mm. wide, the limb subregular, the 5 lobes lemon-yellow, triangular, 5 mm. long, incurved; filaments slender, glabrous, shortly united at base; anthers orbicular; ovary white-pilose; stigma bilobed; disk reduced to a single posterior gland. [Description adapted from Raymond]

TYPE: Panama, ex Mrs. M. Cogswell, cultivated in the Montreal Botanical Garden, no. 2940-59, Raymond (MTJB, not seen).

RANGE: Known from the original material only, of unknown origin.

5. *Columnnea silvarum* Morton, Ann. Mo. Bot. Gard. 29: 53. 1942.

Stems 0.6-3.6 meters long, thick, densely red-hispid; leaves of a pair unequal, the larger subsessile; petioles thick, about 2 mm. long; leaf-blades oblong, up to 16 cm. long and 5.5 cm. wide, abruptly short-acuminate, strongly unequal and oblique at base, not amplexicaul, glandular-denticulate, green and pilosulous above, green beneath and hirsute on the veins, the lateral veins about 10 pairs, prominulous; smaller leaf of a pair stipule-like, lanceolate, sessile, about 1 cm. long and 4 mm. wide, acuminate, oblique at base, green; inflorescences 2-or 3-flowered, bracteate, the bracts linear-subulate, about 8 mm. long, 1 mm. wide, entire; peduncles 15-25 mm. long, slender, densely red-hirsute; calyx 20-25 mm. long, the lobes linear-subulate, subequal, about 3 mm. wide at base, long-acuminate, remotely laciniate, the teeth about 3 on each side, 2 mm. long, red-hirsute on both sides; corollas yellow, the lobes purple at base, 40-45 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, enlarged upwardly and a little ventricose, becoming 10 mm. wide, a little contracted in throat, this 7 mm. wide, sparsely pilose externally, pilosulous within at base, the limb subregular, about 1 cm. wide, the lobes spreading, suborbicular, about 3 mm. long, rounded, the two upper slightly connate, glabrous within; filaments glabrous; anthers exserted, coherent, about 2 mm. long and wide; ovary sericeous; style glabrous; stigma shortly bilobed, sparsely glandular-pilosulous.

TYPE: Caña-Cuasi Trail, Chepigana District, Darien, Panama, Terry 1566.

RANGE: Known only from Panama, at elevations from 600 to 1500 meters.

DARIEN: Caña-Cuasi Trail, Chepigana District, Terry 1499.

6. *Columnnea perpulchra* Morton, Ann. Mo. Bot. Gard. 29: 51. 1942.

Plants epiphytic, the stems unbranched, about 7 mm. in diameter toward base, becoming 2.5 mm. in diameter upwardly, densely brown-hirsute, the hairs often 6 mm. long; leaves of a pair strongly unequal, the larger subsessile; petioles scarcely 2 mm. long; leaf-blades oblong-ob lanceolate, up to 16 cm. long and 4.7 cm. wide, abruptly short-acuminate, strongly oblique at base but not auriculate or amplexicaul, serrulate, green and pilose above, hirsute beneath and red at apex, or red or red-spotted throughout, the lateral veins about 11 pairs, prominulous beneath; smaller leaf of a pair stipule-like, sessile, ovate, up to 2 cm. long and 1 cm. wide, sharply long-acuminate, strongly oblique at base and auriculate and subamplexicaul on the lower side, hirsute on both sides, red beneath at apex; flowers paired, bracteate, the bracts lance-subulate, about 7 mm. long, entire, acuminate, green, hirsute; peduncles slender, about 20 mm. long, hirsute; calyx pale green, about 20 mm. long, the lobes lanceolate, 3 mm. wide (excluding teeth), acuminate, pilose externally, glabrous within, laciniate, the teeth subulate, up to 3 mm. long, about 6 on each side; corollas yellow, the lobes scarlet at base, about 40 mm. long, spurred at base, the tube 3.5 mm. in diameter above base, abruptly deflexed and ventricose, becoming 8 mm. wide, glabrous

on both sides, a little contracted in throat, this 7 mm. wide, the limb subregular, the lobes reflexed, sparsely strigose externally, the 2 upper connate for about 2 mm., the others free, suborbicular, rounded, all about 5 mm. long, glabrous within; filaments glabrous; anthers included, connate, about 2 mm. long and wide; ovary nearly glabrous; style glabrous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2305.

RANGE: Known only from Panama, at elevations from 40 to 1000 meters.

COLON: Río Fato Valley, Pittier 4209.

7. *Columnnea pectinata* Morton, Ann. Mo. Bot. Gard. 29: 50. 1942.

Plants epiphytic, the stems pendent, 1 meter long, about 8 mm. in diameter, gray-hirsute when young; leaves of a pair unequal, the larger subsessile; petioles scarcely 2 mm. long, hirsute; leaf-blades oblong-falcate, up to 13 cm. long and 5 cm. wide, abruptly acuminate, strongly oblique at base, subauriculate on the lower side, succulent, sharply serrate toward apex, green and hirsute above, paler beneath and scarlet tinged toward apex, densely hirsute, the lateral veins 8-10 pairs; smaller leaves of a pair stipule-like, sessile, lanceolate, about 1.7 cm. long, auriculate at lower side, hirsute; inflorescence several-flowered; peduncles about 5 mm. long, densely hirsute; calyx red, about 15 mm. long, the lobes subequal, about 3 mm. wide, pectinate-toothed, the teeth 5 or 6 on each side, subulate, up to 4 mm. long, densely hirsute on both sides, the hairs hyaline, multicellular, capitate-glandular; corolla orange, only slightly exerted from calyx, about 17 mm. long, a little spurred at base, the tube about 4.5 mm. in diameter above base, a little ventricose upwardly and becoming 6.5 mm. wide, contracted and 5 mm. wide in throat, white-pilose externally, the limb regular, 7 mm. wide, glabrous within, the lobes spreading, suborbicular, about 3 mm. long, rounded; filaments glabrous; anthers included, coherent in pairs, 1.5 mm. long, 2 mm. wide; ovary white-sericeous; style glabrous; stigma stomatomorphic.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2394.

RANGE: Known only from the type locality.

COCLÉ: El Valle de Antón, Allen 1787, 2177, 2919, 2944, 4479.

8. *Columnnea purpurata* Hanst. Linnaea 34: 386. 1865.

Plants epiphytic or terrestrial, 1.2-1.8 m. long, the stems woody, unbranched, 6-10 mm. in diameter, densely yellowish-hirsute; leaves clustered at apex of stem, those of a pair strongly unequal, the larger short-petiolate; petioles 10-15 mm. long, densely hirsute; leaf-blades oblanceolate, 13-30 cm. long, 4-10 cm. wide, long-acuminate, cuneate and strongly unequal at base, serrulate, the teeth 40 to a side or more, pilose on both sides, not red or red-spotted beneath, the lateral veins 9-11 pairs; smaller leaf of a pair sessile, ovate, oblique, up to 3 cm. long and 10 mm. wide, long-acuminate, deeply toothed, hirsute; flowers fasciculate in upper axils, peduncles very short, bracteate, the bracts scarlet, elliptic or lanceolate, about 30 mm. long and 15 mm. wide, long-pilose externally, strigose within, spinulose-toothed, the teeth

subulate, elongate, 4 or 5 to a side; bractlets similar but smaller; calyx scarlet, 30 mm. long, the lobes lanceolate, 5 mm. wide near base, long-acuminate, long-pilose externally, strigose within, spinulose-toothed, the teeth long-red-pilose, 3 or 4 on each side; corollas yellow, 30 mm. long, the tube 4 mm. wide above base, slightly ventricose and becoming 7 mm. in diameter, contracted toward throat, densely brown-sericeous externally, glabrous within, the limb narrow, regular, about 6 mm. wide, the lobes subequal erect, 4 mm. long, 3 mm. wide, sericeous externally, glabrous within; filaments glabrous at base, pilosulous upwardly; anthers connate, 2 mm. long and wide; ovary long-pilose; style glabrous.

SYNTYPES: Costa Rica, Wendland 548, Warscewicz 242, Valentini, s.n.

RANGE: Costa Rica and Panama, at elevations from 50-1500 meters.

CANAL ZONE: Barro Colorado Island, Standley 31393.

DARIEN: Caña, Stern et al. 466; Paca, near Caña, Williams 802; between Pinogana and Yavisa, Allen 285.

PANAMA: Hayes 955.

9. *Columnea darienensis* Morton, Ann. Mo. Bot. Gard. 29: 46. 1942.

Shrub 1.5-4.5 m. high, the stems scarcely branched, about 3 mm. in diameter toward apex, densely strigose; leaves of a pair strongly unequal, the larger petiolate; petioles 10-14 mm. long, strigose; leaf-blades oblanceolate, 16-23 cm. long, 4-5.5 cm. wide, acuminate, oblique and broadly cuneate at base, not amplexicaul, entire, green and glabrous above, paler beneath, not red-spotted, strigose, especially on the veins, the lateral veins 7 pairs, obscure above; smaller leaf of a pair stipule-like, minute, lanceolate, 1-1.5 cm. long, 3-5 mm. wide, acuminate, glabrous above, strigose beneath, soon deciduous; inflorescence few-flowered, the bracts ovate, about 17 mm. long, acuminate, entire, probably red; peduncles about 5 mm. long, thick, strigose; calyx probably red, ca. 17 mm. long, the lobes lanceolate, 5 mm. wide near base, acuminate, glandular-serrulate, the teeth about 7 on each side, strigose externally on the midrib and margins, glabrous within; corollas orange-scarlet, 24 mm. long, the tube 3 mm. wide above base, upwardly a little ventricose, and becoming 5 mm. in diameter, a little contracted in the throat and here 4.5 mm. wide, densely yellowish strigose externally, the limb small, scarcely irregular, about 5 mm. wide, the lobes erect, suborbicular, rounded, the three lower about 1 mm. long, the two upper 2 mm. long, partly connate; filaments glabrous; anthers 1.5 mm. long and wide; ovary strigose at apex; style glabrous.

TYPE: Cerro de Garagará Sanbú Basin, Darien, Panama, Pittier 5660.

RANGE: Known only from Panama, at elevations from 500 to 1650 meters.

DARIEN: Caña-Cuasi Trail, Chepigana District, Terry 1547.

10. *Columnea florida* Morton, Journ. Washington Acad. Sci. 27: 310. 1937.

Plants epiphytic, the stems thick, about 1 cm. in diameter, the young ones hirsute, the hairs flaccid, multicellular; leaves of a pair strongly unequal, the larger short-petiolate; petioles thick, about 1 cm. long, densely hirsute; leaf-blades oblanceolate, up to 35.5 cm. long and 10.5 cm. wide, sharply short-acuminate, obtuse and oblique at base, entire, glabrous above or with a few hairs toward base,

appressed-pilose beneath, the costa hirsute at base, paler beneath, conspicuously red-spotted toward apex, the lateral veins about 12 pairs; smaller leaf of a pair subsessile, narrowly elliptic, about 3 cm. long, 6-7 mm. wide, long-acuminate, glabrous above, densely pilose beneath, the veins obscure; flowers fasciculate, few to many; peduncles thick, up to 10 mm. long, densely hirsute, bracteate at middle, the bracts small, lanceolate, densely hirsute; calyx 23 mm. long, the lobes ovate, ca. 10 mm. wide near base, densely hirsute on both sides, pectinate-incised, the teeth numerous, narrowly linear, green, green-hirsute; corollas yellow, thick, ca. 25 mm. long, the tube 5.5 mm. wide at base, not constricted above base, ventricose, becoming 9 mm. wide, densely brown-hirsute externally, sparsely puberulous within, a little contracted in throat, this scarcely 5 mm. wide, the limb nearly regular, about 5 mm. wide, the lobes small, erect, suborbicular, about 2.5 mm. long and 3 mm. wide, glabrate; filaments pilosulous; anthers connate in pairs, oblong, 3 mm. long, 1.3 mm. wide; ovary densely pilose; style pilosulous; stigma slightly bilobed.

TYPE: El General, Prov. San José, Costa Rica, 915 m., Skutch 2436.

RANGE: Costa Rica and Panama, at elevations from 500 to 1100 meters.

DARIEN: Cerro de Garagará, Sambú Basin, Pittier 5664.

11. *Columnnea crassa* Morton, Ann. Mo. Bot. Gard. 29: 45. 1942.

Plants epiphytic, the stems ca. 0.75 m. long, about 10 mm. in diameter, densely hirsute, the hairs brown, thin, multicellular; leaves of a pair unequal, the larger petiolate; petioles about 8 mm. long, very thick, densely hirsute; leaf-blades narrowly oblanceolate, subfalcate, 13-21 cm. long, 3-5 cm. wide, long-acuminate, strongly oblique at base, succulent, entire, green and glabrous above, densely yellow-strigose beneath, bearing one or two red spots about 5.5 cm. below apex, the primary veins about 8 pairs; smaller leaf of a pair stipule-like, sessile, narrowly lanceolate, about 2.5 cm. long and 8 mm. wide, auriculate at lower base and amplexicaul, green, glabrous above, strigose beneath; flowers solitary (?), subsessile; calyx 16-20 mm. long, the lobes subequal, 4-7 mm. wide, acuminate, glandular-serrate, the teeth many, appressed-hirsute externally, subglabrous within except the hirsute midrib; corollas unknown.

TYPE: Cerro Campana, Prov. Panama, Panama, 1000 m., Allen 2423.

RANGE: Known only from the type.

12. *Columnnea consanguinea* Hanst. Linnaea 34: 383. 1865.

Plants terrestrial or epiphytic, the stems unbranched, 0.9-1.2 meters long, 3-5 mm. in diameter, closely sericeous-strigose; leaves of a pair unequal, the larger short-petiolate; petioles ca. 1 cm. long, sericeous; leaf-blades narrowly oblanceolate, 9-25 cm. long, 3.5-6 cm. wide, short-acuminate, oblique at base, rounded at lower base, cuneate at upper, entire, green and glabrous above, strigose and red-spotted beneath, the spots often large and elongate, the lateral veins 6 or 7 pairs; smaller leaf of a pair stipule-like, linear-lanceolate, 1.5-2.5 cm. long, 5-7 mm. wide, long-acuminate, entire; flowers several in an axil, bracteate, the bracts persistent,

yellowish, ovate-lanceolate, 1.5-2 cm. long, 6-8 mm. wide, entire, glabrous above, strigose beneath; peduncles erect, short, ca. 5 mm. long; calyx ca. 16-20 mm. long, green, the lobes equal, lanceolate, acuminate, narrowed toward base, 2.5-4.5 mm. wide near middle, entire or a little serrulate, the teeth few, minute, strigose externally, nearly glabrous within; corollas yellow, 23 mm. long, the tube 5 mm. wide near base, not enlarged upwardly, slightly contracted in throat and here 4 mm. wide, densely sericeous externally, minutely glandular-pilosulous within, the limb regular, 4.5 mm. wide, the lobes erect, equal, 1.8 mm. long, 1.5 mm. wide, sericeous externally, glabrous within; filaments glabrous; anthers 1.5 mm. long and wide; ovary pilose; style glabrous; stigma stomatomorphic.

TYPE: Turrialba, Costa Rica, Wendland 509.

RANGE: Costa Rica and Panama, at elevations from 1200 to 2100 meters.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro de la Horqueta, Allen 4924.

CHIRIQUI: Bajo Chorro, Woodson & Schery 651, Davidson 57; Bajo Mono, Allen 4788.

It is somewhat doubtful if these Panamanian specimens are properly referable to C. consanguinea, for they have the pubescence of the leaves appressed, whereas the typical Costa Rican specimens have a spreading type of pubescence.

13. Columnea conferta Morton, Ann. Mo. Bot. Gard. 29: 44. 1942.

Plants epiphytic, the stems 0.6-1.2 m. long, not branched, about 7 mm. in diameter, strigose, soon glabrous; leaves crowded at apex of stem, those of a pair strongly unequal; petioles up to 4 mm. long, strigose; larger leaf-blades oblanceolate, subfalcate, 28-32 cm. long, 6.5-7 cm. wide, short-acuminate, strongly oblique at base, remotely serrulate, green and glabrous above, sparsely strigose beneath, bearing two red spots about 7 cm. below apex, the lateral veins 10-12 pairs; smaller leaf of a pair stipule-like, deciduous; inflorescence few-flowered, bracteate, the bracts linear, about 2.5 cm. long and 8 mm. wide, long-acuminate, short-petiolate, entire, green; peduncles ca. 9 mm. long, densely strigose; calyx ca. 23 mm. long, the lobes pale, subequal, ovate, about 10 mm. wide near base, sharply long-acuminate, substrigose externally, nearly glabrous within, glandular-serrate, the teeth minute, about 10 on each side; corollas yellow, lined within with red posteriorly, ca. 40 mm. long, a little saccate at base, the tube about 3 mm. in diameter above base, enlarged but not ventricose upwardly, becoming 9 mm. wide, sparsely glandular-pilose externally, glabrous within, scarcely contracted in throat, the limb oblique, probably slightly bilabiate, the lobes subequal, about 6 mm. long, glabrous within; filaments glabrous; anthers not exerted, coherent, about 1.8 mm. long and wide; ovary sparsely pilose; style glabrous; stigma stomatomorphic, glabrous.

TYPE: Caña-Cuasi Trail, Chepigana District, Darien, 1650 m., Terry 1554.

RANGE: Known only from the type.

14. *Columnnea sanguinolenta* (Klotzsch) Hanst. *Linnaea* 34: 389. 1865.
Stenanthus sanguinolentus Klotzsch ex Oerst. Dansk. Vid. Selsk.
 Skrivt. V. 5: 123. 1861.

Stenanthus squarrosus Klotzsch ex Oerst. loc. cit. (type from
 Veraguas, Panama, Warscewicz).

Columnnea costaricensis Kuntze, Rev. Gen. Plant. 2: 471. 1891.

Plants epiphytic, the stems unbranched, about 3 mm. in diameter, densely strigose near apex; leaves of a pair strongly unequal, the larger short-petiolate; petioles about 4 mm. long, strigose; leaf-blades oblanceolate, up to 12 cm. long and 2.5-3.5 cm. wide, acuminate, rounded and oblique at base, remotely glandular-denticulate, glabrous above, strigose beneath on veins and surface, often red-spotted beneath (2-6 spots 1.5-3 cm. below apex), the lateral veins 5-7 pairs; smaller leaf of a pair stipule-like, subsessile, lanceolate, 5-22 mm. long, 2.5-6 mm. wide, acuminate, glabrous above, strigose beneath, green, subentire; flowers solitary or paired; peduncles 15-45 mm. long, long-hirsute, the hairs reddish, multicellular, bracteate at base, the bracts sessile, lanceolate, acuminate, glabrous above, strigose beneath, green; calyx green or red, 25-30 mm. long, the lobes ovate in outline, 22-26 mm. wide (including teeth), the central portion 4.5-5 mm. wide, hirsute externally, glabrous within, deeply pectinate-laciniate, the teeth 8-10 on each side, linear-subulate 8-10 mm. long, 0.8-1 mm. wide at base, long-hirsute, the hairs reddish, multicellular; corollas scarlet, ca. 40 mm. long, the tube 4 mm. wide near base, strongly ventricose, becoming 13 mm. wide, contracted toward throat, this 8 mm. wide, sparsely long-pilose externally, glabrous within, the limb subregular, 10-12 mm. wide, the lobes slightly unequal, about 5 mm. long, 3.5-4 mm. wide, glabrous within, the two upper partly connate, erect, the three lower spreading; filaments minutely and sparingly capitate-glandular; anthers included, connate, 2 mm. long and wide; ovary short-sericeous; style glabrous below, glandular upwardly; stigma bilobed.

TYPE: Veraguas, Panama, Warscewicz (photograph US).

RANGE: Costa Rica and Panama, at elevations from sea level to 700 meters.

BOCAS DEL TORO: Water Valley, von Wedel 942; Fish Creek Mountains, vicinity of Chiriqui Lagoon, von Wedel 2310, 2325; Chiriqui Lagoon, von Wedel 1032; Seibert 1562; Changuinola Valley, Dunlap 449.

In the "Flora of Costa Rica," I listed *Columnnea costaricensis* Kuntze in *Alloplectus*, as a doubtful species. The type in the New York Botanical Garden shows that this species is actually merely a variant of *C. sanguinolenta*.

15. *Columnnea serrata* (Klotzsch) Hanst. *Linnaea* 34: 390. 1865.

Stenanthus serratus Klotzsch ex Oerst. Centralamer, Gesner.
 49. 1858.

Stems hirsute at apex; leaves of a pair unequal; larger leaf-blades obovate-oblong, 7.5 cm. long, narrowly acuminate, acute or obtusish at base, acutely serrate, not red-spotted, glabrous above, hirtous beneath; smaller leaf of a pair about 3 cm. long, obtuse at base;

peduncles equalling corollas, villous; calyx more than half as long as corolla, the lobes subequal, linear, long-acuminate from a broad base, strongly villous externally, cristate-fimbriate, the teeth long-villous; corollas purple, more than 25 mm. long, gibbous at posterior base, pilose; ovary pilose.

TYPE: Veraguas, Panama, Warscewicz (presumably destroyed in Berlin)

RANGE: Known definitely only from the type.

16. *Columnnea illepida* Moore, *Baileya* 8: 56, f. 19. 1960.

Trichantha illepida (Moore) Morton, *Contr. U. S. Nat. Herb.* 38: 12. 1963.

Stems stout, probably not radicant at the nodes, the internodes short, 1-2.5 cm. long, very stout, the upper ones ca. 3 mm. thick, somewhat zigzag, strongly ridged when dry, hirsute, the hairs spreading, yellow, multicellular, eglandular, 2-3 mm. long, borne on tubercles; leaves subdistichous, those of a pair strongly unequal, short-petiolate; petioles 0.3-2 cm. long, hirsute; larger leaf-blades ovate-lanceolate to oblanceolate, up to 13 cm. long and 5 cm. wide, acuminate or sub-cuspidate, broadly cuneate and strongly oblique at base, minutely and remotely denticulate, above green, not bullate, hirsute, the hairs hyaline, several-celled, 1.5-2 mm. long, beneath green with conspicuous red blotches or else red all over, septate-hirsute all over, with also a few, appressed, sharp-pointed, 2-celled hairs, the lateral veins 5 or 6 (or 9?) pairs, slightly elevated on both sides; smaller leaves of a pair early deciduous, like the larger but subsessile, not more than 2.5 cm. long; flowers several in an axil, bracteate, the bracts minute, ca. 4×0.75 mm., hirsute and also with sessile yellow glands; peduncles red, slender, 1 mm. thick or less, hirsute; calyx green, herbaceous, 15-20 mm. long, the lobes free, slightly unequal, the posterior shorter and narrower, the central portion 2.5-3.5 mm. wide, strongly pectinate-toothed, the teeth 4 or 5 (6) on each side, linear, the larger 2 mm. long and 0.5 mm. wide, hirsutulous on both sides with hyaline hairs, some of these elongate and many-celled, some short and 2-celled, both surfaces also with sessile, yellow, globular glands; corollas ca. 50 mm. long, slightly oblique in calyx, slightly spurred at posterior base, the tube dull, clear yellow conspicuously striped with maroon from just below the middle to the bases of the sinuses between the lobes, the stripes 0.5-1 mm. wide, the tube 7.5-10 mm. wide at middle, slightly contracted in throat, externally sparsely hirsute and provided also with some small, spreading, 1-celled hairs, within glabrous except for the glandular-pilosulous throat, the limb somewhat bilabiate, ca. 15 mm. wide, the galea 5.5-6 mm. high, bilobed, conspicuously spotted with maroon, the two lateral lobes deltoid, ca. 5 mm. long, 5-6 mm. wide at base, margined with maroon, the anterior lobe ca. 4.5 mm. long and 4 mm. wide at base, margined with maroon, all the lobes hirsute externally and with short, white, thick-based 1-celled hairs also, the appendages between the corolla lobes yellow, inconspicuous when dry and not over 1 mm. long; stamens included; anthers quadrately connate; ovary green, pilose; style puberulous; stigma bilobed; disk reduced to a whitish, bilobed posterior gland.

TYPE: Cultivated in the Bailey Hortorium, Moore (BH, not seen).

RANGE: Known only from the type and a specimen cultivated in Fantastic Gardens, South Miami, Florida, Feb. 25, 1954, R. G. Wilson.

At the time I published on Trichantha in 1963 the native habitat of this species was unknown. It had been variously reported to be from Ecuador, from Tingo Maria, Peru, or from the Panama Canal Zone. Mr. Henry Butcher, of Chiriquí, Panama, has since written me that he was the original collector, and that the species is a native of the Chiriquí region of Panama. There is no reason to doubt this. A possibly allied species (still undescribed because of inadequate material) so far as flowers go has turned up in the same area.

17. *Columnnea dissimilis* Morton, Ann. Mo. Bot. Gard. 29: 47. 1942.

Plants epiphytic, sparingly branched at base, the branches up to 1 m. long, hispid, the hairs red, spreading, multicellular; leaves of a pair unequal, the larger petiolate; petioles 5-9 mm. long, hispid; leaf-blades elliptic-oblong, up to 7 cm. long and 3 cm. wide, acuminate, strongly oblique at base (rounded on the lower side, cuneate on the upper), entire, green on both sides, pilosulous above, red-hirsute beneath, especially on the veins, the lateral veins about 5 pairs; smaller leaf of a pair mostly sessile, ovate or sub-orbicular, up to 3 cm. long and 1.8 cm. wide, acute or obtuse, rounded at base; flowers mostly 3 in an axil; peduncles 10-17 mm. long, densely long-red-hirsute; calyx red, 25-30 mm. long, the lobes equal, lanceolate, narrowed toward base, about 6 mm. wide above base, acuminate, remotely glandular-denticulate, red-hirsute on both sides; corollas red tipped with yellow, a little oblique in calyx, 35-40 mm. long, a little spurred at base, the tube about 4 mm. wide above base, slightly ampliate upwardly, densely red-sericeous externally, glabrous within, not contracted in throat, this 8 mm. wide, the limb regular, the lobes white, equal, incurved, ovate, about 4.5 mm. long, thick, scarcely acute, glabrous within, the sinuses between each lobe bearing a subulate, densely hirsute, yellow appendage, this 1-7 mm. long; filaments glabrous; anthers about 2 mm. long and wide; ovary white-pilose; style glabrous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2483.

RANGE: Known only from Panama, at elevations of 600 to 1000 meters.

COCLE: El Valle de Antón, Allen 2164, 2191.

PANAMA: Hills above Campana, Allen 1875.

The peculiar appendages of the corolla vary greatly in length and are often hidden under the dense pubescence.

18. *Columnnea warscewicziana* (Klotzsch) Hanst. Linnaea 34: 392. 1865.

Ortholoma warscewiczianum Klotzsch ex Oerst. Centralamer. Gesner. 51. 1858.

Ortholoma vestitum Klotzsch ex Oerst. loc. cit. (Type from Veraguas, Panama, Warscewicz).

Plants epiphytic, the stems pendent, branched, 0.6-1.2 m. long, yellowish-or reddish-villous at apex, the hairs about 2 mm. long, multicellular; leaves of a pair strongly unequal, the larger sessile;

petioles 1-3 mm. long, thick, densely hirsute; leaf-blades oblanceolate, 9-12 cm. long, 2-3.5 cm. wide, acuminate, rounded and strongly oblique at base, remotely serrulate, hirsute on both sides (the hairs multicellular), not red-spotted beneath, the lateral veins 10 or 11 pairs; smaller leaf of a pair stipule-like, 7-16 mm. long, 4-7 mm. wide, acuminate, oblique at base, sessile, hirsute; flowers solitary; peduncles 25-45 mm. long, pendent, red-villous, the basal bracts minute, 4-5 mm. long, linear, hirsute, green; calyx green, 10-12 mm. long, the lobes lanceolate, 3 mm. wide near base, long-acuminate, villous on both sides, entire or with 1 or 2 subulate teeth on each side; corollas scarlet, 40-55 mm. long, gibbous at posterior base, the tube 5 mm. in diameter above base, strongly ventricose upwardly, becoming 19 mm. wide, contracted in throat, this 10 mm. wide, sparingly pilose externally, glabrous within, the limb subregular, 13-21 mm. wide, the lobes about 5 mm. long, the two upper partly connate, erect, the three lower spreading; filaments pilosulous; anthers 2 mm. long and wide; ovary sericeous; style glabrous; stigma stomatomorphic.

TYPE: Veraguas, Panama, Warscewicz.

RANGE: Costa Rica and Panama, at elevations from 1200-2400 meters.

CHIRIQUI: El Boquete, Maxon 5703; Cerro de la Horqueta, Pittier 3215; Bajo Chorro, Rio Caldera, Davidson 406, Butcher; Bajo Mono, Allen 4833.

19. Columnnea ochroleuca (Klotzsch) Hanst. Linnaea 34: 393. 1865.

Ortholoma ochroleucum Klotzsch ex Oerst. Centralamer. Gesner. 51. 1858.

Stems slender, strongly yellowish-villous; leaves of a pair strongly unequal; larger leaf-blades lanceolate, subsessile, 5-7.5 cm. long, broadest at middle, 1.4-2 cm. wide, attenuate to a long acuminate apex, attenuate to base, serrulate, hispid-pilose above, long-villous beneath, deep purple beneath; smaller leaf of a pair stipule-like, 1/5 as long as the larger; peduncles short, villous; calyx 8-10 mm. long, the lobes erect, linear-lanceolate, narrowly long-acuminate, bearing a few long subulate teeth; corollas scarlet, about 36-40 mm. long, the tube ventricose, becoming 8 mm. wide, a little narrowed in throat, pilose, the limb slightly irregular, the two upper lobes erect, partly connate, obtuse, the lower lobes spreading, lanceolate; anthers exerted.

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Known only from the type.

The description has been taken from the original, for no specimens referable to this species have been seen.

20. Columnnea nicaraguensis Oerst. Centralamer. Gesner. 62. 1858.

Plants epiphytic, vinelike, the stems sparingly branched, up to 1 m. long, 6-8 mm. in diameter below, about 2.5 mm. in diameter toward apex constricted at nodes, the epidermis sometimes peeling off in scales, densely appressed-white-pilose when young; leaves of a pair unequal, the larger short-petiolate; petioles up to 3 mm. long, white-villous; leaf-blades leathery, lanceolate, 7-12 cm. long, 2.2-4.5 cm. wide, sharply acuminate, rounded and strongly oblique at base, entire, dark green and thinly strigillose above, light green or dull reddish

beneath (when dry), densely long-strigose on the veins, thinly strigose on the surface, the lateral veins 7-9 pairs, obliquely ascending, obscure above, prominent beneath; smaller leaf of a pair similar to the larger but only 2-2.5 cm. long, 7-10 mm. wide, or rarely larger; flowers solitary; peduncles 7-15 mm. long, densely appressed-white-pilose, bracteate at base, the bracts broadly lanceolate, 7-9 mm. long, about 3 mm. wide, acuminate, hairy on both surfaces; calyx variable, 17-35 mm. long, the lobes lanceolate or ovate-lanceolate, 7-9 mm. wide, broadest near base, long-acuminate, appressed-white-pilose on both sides, especially on the midrib, remotely short-toothed below middle, the teeth mostly 2 on each side, sometimes minute or obsolete, glandular at apex; corollas dark red, marked with yellow within throat, 60-80 mm. long, the tube about 5 mm. in diameter near base, gradually enlarged upwardly, not ventricose, becoming 9-10 mm. wide in throat, densely white-sericeous externally, glabrous within, the limb strongly bilabiate, the galea 35 mm. long, 20 mm. wide, deeply emarginate, densely white-pilose externally, thinly pilose within, the lateral lobes long-connate with galea, the free parts narrow, the upper free margin 11-15 mm. long, the lower lobes spreading, linear, 25-30 mm. long, 4-5 mm. wide, acuminate, densely white-sericeous externally in a broad central line; filaments pilose upwardly; anthers yellow, exserted, connate, 2.5 mm. long, 1.5 mm. wide; ovary sericeous; style densely pilosulous upwardly.

TYPE: San Juan, Nicaragua, Oersted.

RANGE: Nicaragua, Costa Rica, and Panama, at elevations from sea level to 300 meters.

BOCAS DEL TORO: Carleton 256; Water Valley, von Wedel 734, 839; Fish Creek Mountains, von Wedel 2252; Little Bocas, near Chiriqui Lagoon, von Wedel 2522; Chiriqui Lagoon, Hart 142, Changuinola Valley, Dunlap 419, 456; Malamanca Valley, Carleton 133.

21. *Columnnea tomentulosa* Morton, Field Mus. Publ. Bot. 18: 1169. 1938.

Columnnea tomentosa Oerst. Centralamer. Gesner. 64. 1858, not Roxb.

Plants epiphytic, 0.2-0.4 m. long, the stems branched, 2-4 mm. in diameter, tomentose; leaves of a pair subequal, short-petiolate; petioles 2 mm. long, tomentose; leaf-blades oval, up to 2.5 cm. long, 9-12 mm. wide, obtuse, broadly cuneate and equal at base, entire, soft-tomentose on both sides, the lateral veins 2 or 3 pairs; flowers solitary; peduncles 7-9 mm. long, white-tomentose, the bracts lanceolate, minute, 4-6 mm. long, 1-2 mm. wide; calyx 7-10 mm. long, the lobes ovate-lanceolate, 5-5.5 mm. wide near base (including teeth), acuminate, deeply subulate-toothed, the teeth 2 or 3 to a side, up to 2.5 mm. long, pilose externally, glabrous within at base, sericeous toward apex; corollas scarlet, the limb margined with yellow, 40-45 mm. long, gibbous at base, the tube 1.5 mm. in diameter above base, enlarged to throat (this 6 mm. wide), pilose externally, glabrous within, the limb bilabiate, the galea oblong, 15 mm. long, 7 mm. wide, obtuse, entire, the lateral lobes long-connate with galea, the free parts 3.5 mm. long, the lower lobe reflexed, linear, 8.5 mm. long, 2.5 mm. wide; filaments glabrous; anthers exserted, oblong, 1.5 mm. long,

0.7 mm. wide; ovary puberulous; style glabrous at base, long-pilosulous upwardly; stigma bilobed.

TYPE: San Juan, Nicaragua, Oersted.

RANGE: Nicaragua, Costa Rica, and Panama, at elevations from sea level to 100 meters.

BOCAS DEL TORO: Rio Cricamola, Woodson, Allen & Seibert 1876, Cooper 206; Valley of Biarra River, Seibert 1538.

22. Columnnea flaccida Seem. Bot. Voy. Herald 186. 1854.

Plants epiphytic, the stems slender, up to 2 m. long, 2.5-3.5 mm. in diameter, strigose, soon glabrate; leaves of a pair subequal, very short-petiolate; petioles 1-2 mm. long, strigose; leaf-blades oblong-lanceolate, 2.5-3 cm. long, ca. 1 cm. wide, long-acuminate, rounded at base, entire, succulent, green and sparingly strigose on both sides, the lateral veins about 5 pairs, obscure above; flowers solitary, borne on leafless stems; peduncles about 5 mm. long, hirsute; calyx red, 12-15 mm. long, the lobes linear-lanceolate, 10-14 mm. wide near base (including teeth), long-acuminate, deeply lancinate-toothed, the teeth 3 or 4 on each side, up to 5 mm. long and 0.8 mm. wide, red-hirsute externally, glabrous within except near apex; corollas rose-red with yellow markings, 50-60 mm. long, gibbous at base, the tube 3 mm. wide above base, gradually enlarged upwardly, becoming 7-9 mm. wide in throat, pilose externally, glabrous within, the limb bilabiate, the galea 20-24 mm. long, 12-13 mm. wide, minutely apiculate, the lateral lobes long-connate with galea, the free parts 7-9 mm. long, the lower lobe lanceolate about 10 mm. long, 2.5 mm. wide; filaments glabrous; anthers connate, oblong, 2.5 mm. long, 1 mm. wide; ovary sericeous; style glabrous at base, pilosulous toward apex; stigma bilobed.

TYPE: Gualaca, Chiriquí, Panama, Seemann (not seen).

RANGE: Costa Rica and Panama, at elevations from 80 to 600 meters.

CHIRIQUI: Mula, April 23, 1961, Butcher.

23. Columnnea panamensis Morton, Ann. Mo. Bot. Gard. 26: 312. 1939.

Plants epiphytic, the stems sparsely branched, up to 1 m. high, 5-8 mm. in diameter, the branchlets about 3 mm. in diameter, sparsely strigose, short, densely antrorsely strigose, the nodes constricted; leaves of a pair equal, short-petiolate; petioles ca. 4 mm. long, strigose-hirtellous; leaf-blades elliptic or narrowly elliptic, 4-4.5 cm. long, 1.5-1.9 cm. wide, scarcely acute, cuneate at base, entire, densely strigose-pilose on both sides, unspotted, the lateral veins 4 pairs; flowers solitary, ascending; peduncles 15 mm. long, densely white-tomentose; calyx 15 mm. long, the lobes linear-oblong, acute, narrowed toward base, about 4 mm. wide above base, entire, pilose on both sides; corollas scarlet, 65-70 mm. long, gibbous at posterior base, the tube 4 mm. in diameter above base, ampliate upwardly but not ventricose, not contracted in throat (this 10-11 mm. wide), pilose externally, the limb strongly bilabiate, the galea 30-35 mm. long, 14 mm. wide, entire, the lateral lobes long-connate with galea, the free parts 9-10 mm. long, the lower lobe spreading, linear-oblong, 15-17 mm. long; filaments pilosulous; anthers connate,

2.6 mm. long, 1.5-2 mm. wide; ovary densely white-villous; style pilosulous; stigma stomatomorphic.

TYPE: Casita Alta, Volcán de Chiriquí, Prov. Chiriquí, Panama, Woodson, Allen, & Seibert 860.

RANGE: Known only from Panama, at elevations from 1500 to 2100 meters.

CHIRIQUI: Finca Lerida, Woodson & Schery 235, Allen 4763.

24. *Columnnea hirta* Kl. & Hanst. *Linnaea* 34: 403. 1865.

Epiphytic, branched, the branches pendent, terete, 2-2.5 mm. thick (3.5 mm. when fresh), strongly red-hirsute; leaves of a pair subequal; petioles nearly equal, 4-5 mm. long (to 10 mm. when fresh); larger leaf-blades oblong, 3-4.2 cm. long (to 5.3 cm. fresh), 1.3-1.7 cm. wide (2.5 cm. when fresh), rounded at base, obtuse at apex, sparingly toothed, the teeth 3-5 pairs, not prominent in dried specimens, densely pilose on both sides; peduncles 6-7 mm. long (8-9 mm. when fresh), recurved, basally bibracteate, the bracts linear, ca. 3.5 mm. long (4.5 x 1 mm. fresh), pilose externally, glabrous at base within but glandular with sessile globular, shining glands; calyx green, erect, the lobes nearly free, united at base for 1 mm., lanceolate, 12-15 mm. long, narrowed to 2.5 mm. wide at base, 4-5 mm. wide upwardly, long-attenuate to a slender tip, strongly toothed, the teeth normally 2 pairs, 0.5-1 mm. long and 0.5-0.75 mm. wide, densely white-hirsute externally, subglabrous within except toward apex, the basal part with sessile, minute glands; corollas orange-scarlet, not spotted or lined, 70-75 mm. long, the tube gibbous at posterior base, here 3.3-5.5 mm. wide, narrowed above base to 3-4 mm., 35-45 mm. long, not contracted in throat, densely red-pilose externally and also bearing minute, spreading, hyaline hairs but these not prominent, the limb 25-30 mm. long, the throat 11-12 mm. wide, pilosulous within, the galea 16 mm. wide (fresh), cuspidate at the truncate apex, the cusp or appendage bearing several elongate, red, septate hairs, the lateral lobes 13 mm. long and 6 mm. wide at base, the posterior lobe spreading, 18 mm. long and 6 mm. wide, with appendages borne in the sinuses between the lateral lobes and the posterior, these rather prominent, especially in bud, consisting of a protuberance from the tube, this more or less tuberculate at apex, each of the several (up to 10) tubercles surmounted by an elongate red septate hair, with appendages present also between the lateral lobes and the galea but these quite inconspicuous, especially in dried material; filaments connate at base into a sheath 3 mm. long laterally, 5 mm. long anteriorly, roughened below, very sparsely and minutely pilosulous upwardly; anthers quadrately connate, 3-3.5 mm. long and 1.7-2 mm. wide; ovary green, small, 3 mm. long, densely hirsute; style glabrous at base, pilosulous upwardly, scarcely curved at apex; disk reduced to a solitary posterior gland, this 1.5 mm. long and wide, white, glabrous, emarginate.

TYPE: Veraguas, Panama, Warscewicz (presumably destroyed in Berlin).

RANGE: Costa Rica and Panama, at elevations from 600 to 1400 meters.

For an illustration see Morton, *Baileya* 11: 26. 1963.

25. *Columnnea mertonii* Raymond, Bot. Notis. 114: 346, f. 1-3. 1961.

Epiphyte, the stems short, 10-30 cm. long, rigid, fleshy, ca. 4-6 mm. in diameter, brown, densely long-pilose with soft, yellowish, multicellular, glandular, spreading hairs 2-2.5 mm. long, bulbous at base; leaves numerous, crowded; petioles 3-4 mm. long, thick, pilose with soft white hairs; leaf-blades of a pair equal, broadly ovate to suborbicular, 2-2.75 cm. long, 1.2-2 cm. wide, obtuse to rounded at apex, rounded at base, fleshy (ca. 3 mm. thick when fresh) entire, green above, paler beneath, white-pilose on both sides (more sparingly so above), the hairs spreading, soft, the lateral veins 2 or 3 pairs; flowers axillary, solitary; peduncles 3-8 mm. long, glandular-pilose (the hairs white, spreading, red-based), bracteate, the bracts 2, deltoid, minute, ca. 1 mm. long and wide, acute, red-pilose on both sides; calyx-lobes green, linear-oblong, 10-12 mm. long when fresh, 3.5-4 mm. wide, narrowed to base, this ca. 2 mm. wide, long-acuminate, bearing 1 pair of teeth above the middle, glandular-pilose, the hairs spreading, white with red bases; corolla erect in calyx, brilliant red, not spotted, 80-85 mm. long strongly bilabiate, gibbous at posterior base (the gibbosity ca. 3 mm. long), narrowed above base to 5 mm., 7-8 mm. wide at middle, gradually widened to throat, this 12 mm. broad, the tube 45 mm. long, glandular-red-hirsute externally, the galea 20-28 mm. long, 17.5 mm. wide, rounded at apex and submucronate, sulcate on the back, the lateral lobes triangular, 10-15 mm. long, the labellum horizontal, 16-17.5 mm. long, ca. 7 mm. wide, replicate, the limb pubescent within; filaments exserted, united at base for 2 mm., strongly glandular-pilose; anthers oblong, 2.5 mm. long, 2 mm. wide, the cells distinct; ovary densely white-pilose; style glabrous at base, pilosulous upwardly; stigma yellowish green, papillose, bilobed; disk reduced to a posterior gland, this low, fleshy, white, ca. 1 mm. long; berry depressed-globose, fleshy, 15 mm. in diameter, white-pilose.

TYPE: Panama, cultivated in the Montreal Botanical Garden from material received from the Fairchild Tropical Garden, Raymond 1820-56 (holotype MTBG, not seen; isotype US).

RANGE: Probably local in Panama, perhaps from the Chiriquí region, but not known definitely in the wild.

This species is very floriferous and beautiful in cultivation in the Longwood Gardens. It is like C. hirta in many ways, but the leaves are shorter petiolate, the blades broader, the bracts minute and deltoid, the calyx hairs red-based, the calyx-lobes less toothed, and the filaments glandular-pilose.

26. *Columnnea localis* Morton, Field Mus. Publ. Bot. 18: 1165. 1938.

Columnnea microcalyx var. macrophylla Donn. Smith, Bot. Gaz.

31: 118. 1901, not C. macrophylla Kuntze.

Plants epiphytic, the stems yellowish, slender, branched, about 1.5 mm. wide, white-pilose; leaves of a pair subequal, short-petiolate; petioles 1.5 mm. long, densely white-pilose; leaf-blades oblong-elliptic, 2-5 cm. long, 1.1-1.7 cm. wide, acute or obtuse, rounded at base, thin, slightly toothed, soft-pilose on both sides, the lateral veins 3 pairs, obscure above; flowers solitary, ebracteate; peduncles 15-25 mm. long, pilose; calyx green, 12 mm. long, the lobes oblanceolate, acute, narrowed at base, here 1.3 mm. wide, broadest near middle, here 3-5.5 mm. wide, acute, entire, pilose on both sides; corollas rose-pink, 70 mm. long, gibbous at base, the tube 3 mm. wide above base, ampliate upwardly, 11-12 mm. wide in throat, thinly pilose externally, the limb bilabiate, glandular-pilosulous within, the galea 30-45 mm. long, ca. 20 mm. wide, rounded, the lateral lobes long-connate with galea, the free parts broad, 10-12 mm. long, the lower lobe deflexed, linear, ca. 22-30 mm. long, 5 mm. wide; filaments glabrous; anthers connate, 3.5 mm. long, 2 mm. wide; ovary white-villous; style pilosulous throughout; stigma bilobed.

TYPE: Tucurrique, Costa Rica, Tonduz 12932.

RANGE: Costa Rica and Panama, at elevations from 500 to 2500 meters.

CHIRIQUI: Cerro Punta to headwaters of Rio Caldera, Allen 1428; Bajo Chorro, Davidson 76; Cerro de la Horqueta, von Hagen 2162.

DARIEN: Cerro de Garagara, Sambu Basin, Pittier 5625.

VERAGUAS: Cerro Tute, near Santa Fe, Allen 4381.

27. *Columnnea consimilis* Morton, Proc. Biol. Soc. Wash. 69: 194. 1956.

Plants epiphytic, the stems 0.5 m. long or more, apparently unbranched, yellowish, about 1.5 mm. in diameter, setose-hispid, the hairs reddish, several-celled, stiffly spreading; leaves borne in two's or three's, those of a whorl equal, short-petiolate; petioles 2-2.5 mm. long, reddish-hispid; leaf-blades rather thin, ovate-lanceolate, 1.6-2.8 cm. long, 6-12 mm. wide, sharply acuminate, rounded and subequal at base, entire, green and glabrous above, pale beneath, very sparingly strigillose, the lateral veins 2 pairs, prominent beneath; flowers solitary (?); peduncles ca. 10 mm. long, coarsely red-setose; calyx green, 20-23 mm. long, the lobes lanceolate in outline, about 8 mm. wide (including teeth), long-acuminate, the teeth 3 or 4 on each side, linear-lanceolate, up to 4.5 mm. long and 1.5 mm. wide at base, glandular at apex; corollas scarlet with pale yellow stripes within, ca. 70 mm. long, the tube 3.5 mm. in diameter near base, gradually enlarged upwardly, becoming 10 mm. wide in throat, sparingly pilose externally, glabrous within, the limb strongly bilabiate, the galea 33 mm. long, 23 mm. wide, emarginate, the lateral lobes partly connate with galea, the free parts about 15 mm. wide at base, the upper margin about 16 mm. long, the lower lobe reflexed, oblong, about 20 mm. long, 11 mm. wide; filaments glabrous; anthers connate, oblong 3 mm. long, 1.2 mm. wide; ovary pilosulous above middle; style pilosulous throughout; stigma deeply bilobed.

TYPE: Cerro Tute, near Santa Fé, Prov. of Veraguas, Panama, 750 m., Allen 4380.

RANGE: Known only from the type.

28. *Columnnea arguta* Morton, Ann. Mo. Bot. Gard. 29: 43. 1942.

Plants epiphytic, the stems pendent, elongate, ca. 1.5 mm. in diameter, rigidly red-pilose when young; leaves of a pair equal; petioles hispid, about 1 mm. long; leaf-blades lanceolate, 1.6-2 cm. long, 6-7 mm. wide, long-acuminate, rounded at base, a little oblique, thick, entire, ciliate, glabrous on both surfaces, green above, reddish beneath, the lateral veins one or two parts, obscure; peduncles 7-9 mm. long, hispid; calyx ca. 15 mm. long, the lobes subequal, 9 mm. wide at base, hirsute on both sides, strongly toothed at base, the teeth 5 or 6 on each side, elongate, up to 3 mm. long and 1 mm. wide; corollas red, the throat lined with yellow, 45-60 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, 7-10 mm. broad in throat, sparsely pilose externally, glandular within at base, the limb bilabiate, glabrous within, the galea 20 mm. long and 13-27 mm. wide, emarginate at apex, the lateral lobes long-connate with galea, the upper free margin 8-13 mm. long, the lower lobe elliptic, reflexed, 9-20 mm. long and 7.5-11 mm. wide; filaments glandular below, glabrous upwardly; ovary sericeous, especially toward apex; style sparsely pilosulous; stigma truncate.

TYPE: El Valle de Antón, Prov. of Coclé, Panama, ca. 1000 m., Allen 2336.

RANGE: Known only from El Valle de Antón.

COCLE: El Valle de Antón, Allen 3718.

29. *Columnnea billbergiana* Beurl. Svensk. Vet. Handl. 1854: 135. 1854.

Plants epiphytic, the stems brown, branched, 2-4 mm. in diameter, sparsely strigose when young; leaves of a pair subequal; petioles 2.5-5 mm. long, strigose; leaf-blades ovate-lanceolate, 2-3 cm. long, 8-11 mm. wide, acute, broadly cuneate at base, entire, glabrous above, pale beneath, strigose on veins and surface, the lateral veins 3 pairs; flowers solitary; peduncles 5-10 mm. long, densely long white or pink-pilose, the bracts minute, linear-lanceolate, 5-7 mm. long, 1.5-2 mm. wide, acuminate, entire, glabrous above, strigose beneath; calyx red, 9-12 mm. long, the lobes ovate-lanceolate, 5-8 mm. wide near base, sharply and abruptly long-acuminate, white-sericeous externally, glabrous within, dentate, the teeth 1-4 on each side, broad-based, glandular, sometimes minute; corollas scarlet, 40-50 mm. long, the tube 1.5-2.5 mm. in diameter near base, only a little enlarged upwardly, becoming 5-6 mm. wide in throat, sparsely glandular-pilose externally, sparsely glandular within near base, the limb strongly bilabiate, the galea about 20 mm. long and 6-7 mm. wide, apiculate, the lateral lobes long-connate with galea, the free parts about 4 mm. long, the lower lobes deflexed, linear or lanceolate, about 12-18 mm. long and 1.5-3 mm. wide; filaments glabrous; anthers exserted, oblong, 2 mm. long, 1-1.2 mm. wide; ovary glabrous except for the sparsely white-pilose apex; style glandular-pilosulous; stigma bilobed.

TYPE: Portobello, Colón, Panama, Beurling.

RANGE: Known only from Panama, at elevations from sea level to 1000 meters.

CANAL ZONE: Lake shore only Gatun River, Pittier 6516; Frijoles, Maxon 6553.

COCLE: El Valle de Antón, Allen 1651, 2149, 2353, 3412, Hunter & Allen 303, 564.

PANAMA: Cerro Campana, Allen 2428, 2432.

30. *Columnnea percrassa* Morton, *Baileya* 7: 59. 1959.

Stems olive green, fleshy, terete, unbranched (at least upwardly), 3 mm. thick, becoming only 2 mm. thick upwardly, sparsely and minutely strigillose, the internodes about 2 cm. long; paired glands present between the leaves; leaves of a pair subequal, short-petiolate; petioles 5-7 mm. long, minutely strigillose; leaf-blades thick and fleshy, dark green and glossy above, pale green beneath, elliptic, narrowly elliptic, or subrhombic, 2.5-3.5 cm. long, 1.1-1.5 cm. wide slightly rounded or acutish at apex, broadly cuneate at base, entire, glabrous above, beneath minutely puberulous on the midribs, sparsely strigillose on the surfaces, weakly ciliolate, the primary veins 3 pairs; flowers solitary, axillary; peduncles green, recurved, 15-20 mm. long, terete, ca. 1 mm. thick, thickened toward apex, rather strongly white-pilosulous, especially toward the apex; calyx green, 10-12 mm. long, the lobes free, equal, broadly subdeltoid, broadest at base, here 5-6 mm. wide, truncate at base, the margins recurved and lying flat against the adjacent lobes to make a 5-angled, 5-winged calyx, sharply long-acuminate at apex, inconspicuously glandular-denticulate, the glands ca. 4 on each side, inconspicuously strigillose externally, sparsely white-pilosulous on the midrib, laxly ciliolate, glabrous within; corollas scarlet, tube orange and red within and with a yellow line from the throat, 55-60 mm. long, slightly oblique in calyx, gibbous at posterior base, the gibbosity ca. 3 mm. long, the tube ca. 3 mm. wide just above base, narrow, gradually enlarged upwardly but not ventricose or curved, becoming ca. 6 mm. wide in throat, sparsely red-pilosulous externally, the hairs several-celled, horizontally spreading, gland-tipped, the limb strongly bilabiate, the galea ca. 27 mm. long and 9 mm. wide (spread out), slightly acutish at apex, the 2 upper lobes completely united, the two lateral lobes almost completely connate with the upper lobes, the free parts triangular, minute, ca. 3 mm. long, recurved, the lower lobe erect at base but arching toward the apex or reflexed, ca. 17 mm. long, 3 mm. wide at base; filaments inserted in the very base of the corolla tube, connate for ca. 2.5 mm., whitish below, reddish above; anthers exserted from the corolla tube, persistently connate, subquadrate, ca. 1.2 mm. long and wide, glabrous; ovary green, ovoid, glabrous below, pilose toward the apex; style pilosulous toward the apex; stigma bilobed, exserted; disk reduced to a thick fleshy, white, bidentate, posterior gland 1.5 mm. long and 2 mm. wide.

TYPE: Cerra Campana, Province of Panama, 1000 m. alt., Apr. 21, 1941, Allen (US).

RANGE: Known only from the type locality and from cultivated material.

PANAMA: Cerro Campana, 400 m., Hutchison & Dressler 2952, cult UCBG, no. 63.2742.

WITHOUT LOCALITY: Cultivated BH, from material received from Mrs. M. Cogswell, possibly originally from Henry Butcher (Moore 7557 bis).

31. *Columnnea oerstediana* Klotzsch ex Oerst. Centralamer, Gesner. 61. t. 8. 1858.

Plants epiphytic, pendulous, 0.6-1.2 m. long, the stems branched, 2-3 mm. in diameter near apex, sparingly strigose, glabrescent; leaves of a pair equal, short-petiolate; petioles ca. 2-3 mm. long, strigose; leaf-blades ovate, 1-1.6 cm. long, 6-10 mm. wide, succulent, obtuse or acutish, rounded at base, entire or slightly toothed at base, green, glabrous above, thinly strigose beneath, the lateral veins 3 pairs, obscure above; flowers solitary, ebracteate; peduncles 8-10 mm. long, thinly strigose; calyx green 14-16 mm. long, the lobes ovate, 6-8 mm. wide above base, sharply long-acuminate, sparsely strigillose externally, glabrous within, dentate toward base, the teeth 3 or 4 to a side, glandular, less than 1 mm. long; corollas scarlet, 60-70 mm. long, the tube about 4 mm. in diameter near base, gradually enlarged upwardly, becoming 8-9 mm. wide in throat, sparsely pilose externally, glabrous within, the limb strongly bilabiate, the galea 25-35 mm. long, 13-15 mm. wide, truncate, the lateral lobes long-connate with galea, the free parts about 8 mm. long, the lower lobe deflexed, linear-lanceolate, 12-18 mm. long, 3-5 mm. wide; filaments glabrous; anthers connate, oblong, 2 mm. long, 1 mm. wide; ovary white-sericeous; style glabrous below, short-puberulous toward apex; stigma bilobed.

TYPE: Naranjo, Costa Rica, Oersted.

RANGE: Costa Rica and Panama, at elevations from 900-2200 meters.

VERAGUAS: Cerro Tute, near Santa Fé, Allen 4335.

32. *Columnnea tenuis* Klotzsch ex Oerst. Centralamer. Gesner. 63. 1858.

Plants epiphytic, the stems whitish, branched, 2-3 mm. in diameter, sparingly strigose when young; leaves of a pair subequal, short-petiolate; petioles 1-1.5 mm. long, strigose; leaf-blades lanceolate or ovate-lanceolate, 2-3.3 cm. long, 5-12 mm. wide, long-acuminate, the base a little oblique, broadly cuneate to rounded, entire, glabrous above, pale beneath, strigose on the veins, sparingly strigillose on the surface, the lateral veins 3 pairs; flowers solitary; peduncles 6-9 mm. long, white-strigose, the bracts minute, about 6 mm. long, 1 mm. wide, acuminate, entire, glabrous above, strigose beneath; calyx reddish, 11-16 mm. long, the lobes ovate-lanceolate in outline, 5-9 mm. wide near base, long-acuminate, sparingly strigose externally, glabrous within, deeply toothed, the teeth deltoid, mostly 1-3 to a side, broad-based, up to 2.5 mm. long and 2 mm. wide at base; corollas scarlet, 60-70 mm. long, the tube about 4 mm. in diameter above base, gradually enlarged upwardly, becoming 11 mm. wide in throat, sparingly pilose externally, glabrous

within, the limb strongly bilabiate, glabrous within, the galea ca. 30 mm. long, 15 mm. wide, truncate, the lateral lobes long-connate with galea, the free parts about 11 mm. long, the lower lobe reflexed, lanceolate, 13-17 mm. long, 4-6 mm. wide; filaments glabrous; anthers connate, 2.5-3 mm. long, 1.2 mm. wide; ovary white-tomentose; style glabrous below, pilosulous above; stigma bilobed

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Known only from Panama, at elevations from 1200 to 2100 meters.

CHIRIQUI: El Boquete, Maxon 5573, Maurice 855; Cerro de la Horqueta. Pittier 3186, Maxon 5407, von Hagen 2132, 2163; Bajo Chorro, Río Caldera, Davidson 257, Butcher; Bajo Mono, Allen 4820.

BOCAS DEL TORO: Allen 4935.

33. *Columnnea obliqua* Morton, Ann. Mo. Bot. Gard. 29: 49. 1942.

Plants epiphytic, the stems unbranched, elongate, pendulous, about 2.5 mm. in diameter, sparsely yellow-strigose, soon glabrous; leaves of a pair equal, subsessile; leaf-blades lanceolate, up to 3.5 cm. long and 1.2 cm. wide, long-acuminate, rounded and strongly oblique at base, entire, succulent, green and glabrous above, paler and reddish beneath, strigose on the margins and veins; flowers solitary; peduncles 7-15 mm. long, 1 mm. thick, substrigose; calyx green, 12-18 mm. long, the lobes equal, ovate, ca. 6 mm. wide at base, abruptly narrowed and sharply long-acuminate, entire, sparsely strigose externally, glabrous within except for the pilosulous base; corollas orange, 65-80 mm. long, a little spurred at base, the tube 3.7 mm. in diameter above base, enlarged upwardly but not ventricose, becoming 12 mm. wide in throat, sparsely pilosulous externally, glabrous within, the limb strongly oblique, bilabiate, the galea 33-38 mm. long, entire, the lateral lobes long-connate with galea, the free parts 13 mm. long, the lower lobe reflexed, linear-oblong, 14-17 mm. long; filaments glabrous; anthers connate in pairs, 1.6 mm. long, 1 mm. wide; ovary white-sericeous; style sparsely pilosulous; stigma bilobed; posterior disk gland large, emarginate, the anterior small linear-subulate.

TYPE: Bajo Chorro, Prov. of Chiriquí, Panama, Woodson & Schery 607.

RANGE: Known only from the Province of Chiriquí, Panama, at elevations of 1800-2100 meters.

CHIRIQUI: Bajo Chorro, Woodson & Schery 677; Cerro de la Horqueta, Allen 4971.

34. *Columnnea allenii* Morton, Ann. Mo. Bot. Gard. 29: 42. 1942.

Plants epiphytic, pendulous, the stems scarcely branched, sparsely strigose, about 1.5 mm. in diameter; leaves of a pair equal; petioles red-strigose, ca. 3 mm. long; leaf-blades oblong-elliptic, succulent, up to 2 cm. long and 1.1 cm. broad, short-acuminate, rounded at base, not oblique, entire, glabrous on both sides, the veins obscure; flowers solitary, ebracteate; peduncles 17-20 mm. long, red-strigose, the hairs multicellular, flaccid; calyx red-tinged, 22-30 mm. long, the lobes ca. 10 mm. broad at base, a little unequal, entire, sharply long-acuminate, slightly strigillose outside, ciliate, long-hirsute

within at base; corollas scarlet, 68-75 mm. long, subcalcarate at base, the tube equalling the calyx, 4 mm. in diameter above base, enlarged upwardly, 15 mm. wide in the throat, sparsely pilose externally, the limb strongly bilabiate, the galea 40-45 mm. long, about 25 mm. wide, truncate at apex, the lateral lobes long-connate with galea, the free parts about 14 mm. long, the lower lobe reflexed, oblong-lanceolate, 27-30 mm. long, 7-8 mm. wide; filaments glabrous; anthers exserted, connate in pairs, oblong, about 3 mm. long and 1 mm. wide; ovary white-pilose; style pilosulous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2179.

RANGE: Known only from El Valle de Antón, Panama, at about 1000 meters elevation.

COCLE: El Valle de Antón, Allen 3554; Cultivated BH, Moore 7545.

35. *Columnnea nervosa* (Klotzsch) Hanst. Linnaea 34: 401. 1865.

Pendadenia nervosa Klotzsch ex Oerst. Centralamer. Gesner.

57. 1858.

Stems short-tomentose at apex; leaves of a pair subequal, short-petiolate; leaf-blades oval-elliptic, a few inches long, acute, obtuse at base (?), lightly serrulate, densely tomentose above, villous-pubescent and deep violet beneath; peduncles hirsute, shorter than the flowers; calyx ca. 13 mm. long, the lobes lanceolate, long-acuminate, incised-dentate, tomentose; corollas red (?), 40 mm. long, the tube 4 mm. in diameter at base, sigmoid-curved, ventricose, becoming 10-12 mm. in diameter, contracted in throat and there 7 mm. wide, the limb bilabiate, oblique, the galea erect, about 12 mm. long, emarginate, the lateral lobes long-connate with galea, broad, obtuse, the lower lobe lanceolate-oblong, porrect; anthers exserted; ovary villous; disk glands 5, the 2 posterior connate.

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Known only from the type.

The above description is adapted from the original and from Hanstein.

36. *Columnnea magnifica* Klotzsch & Hanst. ex Oerst. Centralamer. Gesner. 60. 1858.

Columnnea wendlandiana Hanst. Linnaea 34: 402. 1865.

Columnnea oblanceolata Sprague, Kew Bull. Misc. Inf. 1908: 449. 1908.

Plants epiphytic, 0.3-1.2 m. long, the stems erect, sparingly branched, the branches 3-5 mm. in diameter, hirsute; leaves of a pair subequal; petioles 6-15 mm. long, hirsute; leaf-blades oblanceolate or elliptic-oblanceolate, 5-11 cm. long, 1.3-3.5 cm. wide, acute or very short-acuminate, cuneate to subrounded at base, oblique or nearly equal at base, entire or nearly so, above dark green, appressed-pilose or nearly glabrous, beneath pale green or reddish but lacking definite red spots, stiffly appressed-pilose on the veins, strigillose on the leaf surface, the primary veins 5-7 pairs, impressed above, prominulous beneath; flowers 1-3 in an axil; peduncles 10-20 mm. long, hirsute; calyx reddish, 13-15 mm. long, the lobes ovate-lanceolate,

ca. 5 mm. wide near base, sharply long-acuminate, hirsute externally, nearly glabrous within except near apex, coarsely glandular-toothed, the teeth 4 or 5 on each side; corollas scarlet, the lower lobes yellow within, 60-70 mm. long, the tube ca. 4 mm. in diameter near base, strongly ventricose upwardly, becoming 12-15 mm. in diameter, not contracted in throat, pilose externally, minutely pilosulous within, the limb very large, strongly bilabiate, the galea 33-40 mm. long, 22-28 mm. wide, rounded and entire, pilosulous within, the lateral lobes partly connate with galea, the free parts 12-14 mm. long, the lower lobe spreading, lanceolate, 25-28 mm. long; filaments densely pilosulous throughout; anthers oblong, about 3 mm. long and 2 mm. wide; ovary pilose; style pilosulous; stigma deeply bilobed; disk reduced to a deeply bilobed posterior gland.

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Costa Rica and Panama, at elevations from 1500-2700 meters.

No Panama specimens have been seen, but the species is a conspicuous and abundant plant in the mountains of Costa Rica.

37. *Columnnea incarnata* Morton, Ann. Mo. Bot. Gard. 29: 48. 1942.

Plants epiphytic, the stems scarcely branched, sulcate, about 3 mm. in diameter, yellow-strigose, finally glabrous; leaves of a pair subequal; petioles 1.3-2.3 cm. long, strigose; leaf-blades oblanceolate, 7-12 cm. long, 2.3-4 cm. wide, long-acuminate, cuneate and not oblique at base, entire, a little succulent, green and glabrous above, paler beneath and not red-spotted, strigose on margins and veins, the lateral veins 4 or 5 pairs, obscure above; flowers solitary or paired, bracteate, the bracts linear-subulate, ca. 7 mm. long, 1.5 mm. wide at base, acuminate, entire, strigose externally, glabrous within; peduncles nodding, 30-40 mm. long, densely yellow-strigose; calyx 33-35 mm. long, the lobes green, ovate, ca. 15 mm. wide near base, sharply long-acuminate, remotely glandular-denticulate, glabrous on both surfaces, sparsely ciliate; corollas pink, 65-70 mm. long, a little saccate at base, the tube 5 mm. in diameter above base, abruptly ventricose, ca. 20 mm. long, not exceeding the calyx, puberulous externally, glandular within, the limb bilabiate, curved, strongly oblique, pilose externally, glabrous within, the galea ca. 50 mm. long, 35 mm. wide, truncate, the lateral lobes long-connate with the galea, the free parts ca. 23 mm. long, 13 mm. wide, rounded, the lower lobe spreading, ca. 30 mm. long and 11 mm. wide; filaments densely glandular-puberulous; anthers exserted, coherent, oblong, 3 mm. long and 1 mm. wide; ovary white-sericeous, pilose at apex; style glabrous; stigma bilobed.

TYPE: Bajo Chorro, Prov. of Chiriquí, Panama, Woodson & Schery 608.

RANGE: Known only from Panama, at elevation from 1800-2100 meters.

BOCAS DEL TORO: Northern slopes of Cerro de la Horqueta, Allen 4948.

38. *Columnnea maculata* Morton, Proc. Biol. Soc. Washington 69: 194. 1956.

Shrub, the stems apparently unbranched, thick, 12 mm. in diameter below, 5 mm. in diameter near apex, coarsely hispid, the hairs yellowish, multicellular, borne at the apex of bulbous tubercles;

leaves of a pair strongly unequal, the larger subsessile; petioles 1-2 mm. long, hispid, thick; leaf-blades coriaceous, narrowly oblong, 15-23 cm. long, 6-7 cm. wide, acutish, the base oblique, rounded on the lower side, broadly cuneate on the upper, entire, slightly revolute-margined, green and sparsely pilose above, paler beneath and red at tip, sparsely pilose throughout, the lateral veins 6 or 7 pairs, obscure above, prominent beneath; smaller leaf of a pair deciduous, not seen; flowers apparently solitary in the axils, subsessile; peduncles thick, 1-2 mm. long, densely hispid; calyx ca. 19 mm. long, the lobes ovate-lanceolate, 10-12 mm. wide (including teeth), long-acuminate, broadest near base, densely yellowish-hirsute on both sides, laciniately toothed, the teeth 8-10 on each side, linear-lanceolate, the larger 4 mm. long, 1 mm. wide at base, glandular at apex; corollas yellow, the galea conspicuously spotted with purple within, the other lobes with broad purple lines, 75 mm. long, the tube saccate at posterior base, 4 mm. in diameter above base, not ventricose, gradually enlarged to throat, this about 7 mm. wide, densely white-pilose externally, the limb strongly bilabiate, the galea 32 mm. long, 14 mm. wide, rounded, pilose within, the lateral lobes long-connate with galea, the upper free margin about 13 mm. long, the lower lobe deflexed, lanceolate, 20 mm. long, 5 mm. wide, acuminate; filaments densely pilosulous upwardly; anthers exserted, connate, 3 mm. long, 1.2 mm. wide; ovary sericeous; style glabrous at base, pilosulous upwardly.

TYPE: Fish Creek Mountains, Prov. of Bocas del Toro, Panama, von Wedel 2280.

RANGE: Known only from the type.

39. *Columnea hirsutissima* Morton, Ann. Mo. Bot. Gard. 29: 47. 1942.

Plants epiphytic, the stems unbranched, 0.13-0.3 m. long, strongly red-hirsute, the hairs multicellular, about 5 mm. long; leaves of a pair strongly unequal, the larger subsessile; petioles thick, 1-2 mm. long, hirsute; leaf-blades oblong or narrowly oblong, 6-10 cm. long, 1.7-3.5 cm. wide, acute, rounded or subcordate at base, not oblique, a little crenulate or serrulate, green and densely hirsute on both sides, the hairs reddish, multicellular, the lateral veins 7-9 pairs; smaller leaf of a pair sessile, ovate, about 1 cm. long, densely hirsute; calyx 17-18 mm. long, the lobes subequal, linear, about 2.5 mm. wide near base, long-acuminate, remotely glandular-denticulate, the teeth 2 or 3 on each side, red-hirsute on both sides; corollas red, 60-75 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, gradually enlarged upwardly, sparsely eglandular-pilose externally, glandular within, the throat 8-9 mm. wide, the limb strongly bilabiate, pilosulous within, the galea 23-25 mm. long, 14 mm. wide, truncate at apex, the lateral lobes long-connate with galea, the free parts 6 mm. long, the lower lobe reflexed, linear-oblong, ca. 13 mm. long and 3 mm. wide; filaments glandular near base, glabrous upwardly; anthers connate, exserted, about 2 mm. long and 1 mm. wide; ovary white-pilose; style densely glandular-pilosulous; stigma bilobed.

TYPE: La Valle de Antón, Prov. of Coclé, Panama, Allen 2288.

RANGE: Known only from the province of Coclé, Panama, at elevations from 400 to 1000 meters.

COCLE: El Valle de Antón, Allen 2279, 2311, 2348, 2882; Dressler (cult. BH, no. G886, MTJB, no. 2203-65), La Pintada, Hunter & Allen 553. 40. *Columnnea citrina* Morton, Ann. Mo. Bot. Gard. 29: 44. 1942.

Plants terrestrial, the stems ca. 0.6 m. long, not branched, about 9 mm. in diameter at base, 3 mm. in diameter at apex, strigose toward apex; leaves of a pair strongly unequal; larger leaf-blades oblong-linear, falcate, sessile, auriculate at lower base and semiamplexicaul, 20-25 cm. long, 5 cm. wide, long-acuminate, succulent, green and glabrous above, paler and substrigose beneath, bearing a red spot 8 mm long about 6 cm. below apex, the lateral veins 8-10 pairs; smaller leaf of a pair stipule-like, sessile, linear-lanceolate, about 2 cm. long and 5 mm. wide, long-acuminate, strongly oblique at base, flowers geminate, bracteate, the bracts yellow, linear-lanceolate, about 1.5 cm. long and 5 mm. wide, long-acuminate, strigose without, glabrous within; peduncles thick, 1-1.5 cm. long, densely strigose; calyx pale greenish-yellow, 30-45 mm. long in flower, the lobes equal, ovate-lanceolate, ca. 12 mm. wide, sharply long-acuminate, coarsely dentate, substrigose externally, glabrous within except on the midrib; corollas bright yellow, lined within with red-brown, 47-60 mm. long, a little spurred at base, the tube 5-6 mm. in diameter above base, ventricose upwardly, not contracted in throat, strongly hirsute externally or glabrate, the limb strongly bilabiate, glabrous within, the galea 25-35 mm. long, strongly bilobed (7 mm.), the lateral lobes long-connate with galea, the free parts about 12 mm. long, the lower lobe reflexed, linear-oblong, 18 mm. long and 5 mm. wide; filaments glabrous; anthers exerted, 3 mm. long and 2.5 mm. wide; staminodium subulate, 3 mm. long; ovary densely white-sericeous; style glabrous; stigma stomatomorphic.

TYPE: Cerro Campana, Prov. of Panama, Panama, ca. 1000 m., Allen 2404.

RANGE: Known only from Panama, on rocks at elevations of about 1000 meters.

COCLE: Hills north of El Valle de Antón, Dressler 2950.

41. *Columnnea rubra* Morton, Ann. Mo. Bot. Gard. 29: 52. 1942.

Plants epiphytic, the stems scarcely branched, strigose, soon glabrous; leaves of a pair unequal, the larger short-petiolate; petioles about 2 mm. long, very thick, about 4 mm. in diameter; leaf-blades narrowly oblong or oblanceolate, up to 14 cm. long and 4.7 cm. wide, acute, rounded and subequal at base, succulent, entire, pale green and glabrous above, strigose and red all over beneath, the midrib strongly thickened, the lateral veins about 8 pairs; smaller leaf of a pair soon deciduous, not seen; flowers paired, bracteate, the bracts linear-lanceolate, about 5 mm. long, entire, red-strigose externally; peduncles ca. 10 mm. long, densely red-strigose; calyx red, ca. 19 mm. long and lobes equal, linear-lanceolate, ca. 5 mm. wide near base, sharply long-acuminate,

densely red-strigose on both sides, remotely glandular-serrate, the teeth about 4 on each side; corollas yellow, 60-65 mm. long, a little spurred at base, the tube 2 mm. wide above base, gradually enlarged upwardly but not ventricose, becoming 7 mm. wide in throat, pilose externally, the hairs few-celled, capitate-glandular, the limb bilabiate, the galea 25 mm. long, 7 mm. wide, entire, apiculate, the lateral lobes long-connate with galea, the free parts 7 mm. long, the lower lobe reflexed, linear, 14 mm. long, 4 mm. wide, all lobes glandular-pilosulous on both sides; filaments glabrous; anthers connate, oblong, 2.2 mm. long, 1.6 mm. wide; ovary cylindric, sericeous; style glandular-pilosulous; stigma bilobed, glandular-pilosulous.

TYPE: El Valle de Antón, Prov. of Coclé, Panama, Allen 2469.

RANGE: Known only from El Valle de Antón, at elevations of about 1000 meters.

COCLE: El Valle de Antón, Allen 3411, 4183.